

NAVSEA  
STANDARD ITEM

FY-01

ITEM NO: 009-73  
DATE: 23 SEP 1999  
CATEGORY: I

1. SCOPE:

1.1 Title: Shipboard Electrical/Electronic/Fiber Optic Cable; remove, relocate, repair, and install

2. REFERENCES:

- a. Standard Items
- b. DOD-STD-2003, Electric Plant Installation Standard Methods for Surface Ships and Submarines
- c. MIL-STD-2042, Fiber Optic Topology Installation Standard Methods for Naval Ships
- d. S9300-A6-GYD-010, Electrical Workmanship Inspection Guide for Surface Ships and Submarines
- e. ***SE000-00-EIM-110, Navy*** Installation and Maintenance Book (***NIMB***), Installation Standards
- f. MIL-STD-1310, Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety
- g. 407-5287561, Industrial Electromagnetic Compatibility (IEMC) Work Process Instructions
- h. MIL-STD-1680 (CONFIDENTIAL), Installation Criteria for Shipboard Secure Electrical Information Processing Systems

3. REQUIREMENTS:

3.1 Isolate and remove each cable designated for removal or replacement by the individual Work Items.

3.1.1 Remove each cable in its entirety.

3.1.1.1 Blank each bulkhead, deck penetration, and multi-cable transit device from which cable was removed and which will not be reused, in accordance with Section 3 of 2.b and Part 3 of 2.c.

3.1.1.2 Blank each hole not required to be used in equipment from which cable was removed.

3.1.1.3 Remove unused hangers from which cable was removed and which will not be reused, and grind areas flush in way of removals.

3.1.1.4 Install new banding for cableways affected by cable removals, in accordance with Section 4 of 2.b and Part 4 of 2.c.

3.2 Identify and isolate each cable to be pulled back, rerouted, relocated, or reused to support work required by the individual Work Items.

3.2.1 Inspect each cable end to be disconnected for correct identification sleeving, including size, type, and legible lettering in accordance with referenced drawings. Ensure lugs are secured to leads and are of correct size and type, and the insulation is not damaged. Ensure optical connectors are secured to the cable, the correct type, and the cable jacket is not damaged. Accept and reject criteria for lugs and sleeving for non-fiber optic cables shall be in accordance with 2.d.

3.2.1.1 Submit four legible copies of a report listing results of the requirements of 3.2.1 to the SUPERVISOR.

3.2.2 Disconnect each cable. Record and retain electrical and optical hook-up data.

3.2.2.1 Accomplish the requirements of 009-22 of 2.a for disconnected non-fiber optic cables.

3.2.2.2 Accomplish the requirements of Method 6D1 of Part 6 of 2.c for fiber optic cable.

3.2.3 Remove each cable from equipment and pull back to predetermined locations. Coil each cable and secure to prevent damage.

3.2.4 Reinstall each cable to equipment or component in accordance with 2.b and 2.e for non-fiber optic cable, and 2.c for fiber optic cable.

3.2.5 Band disturbed cable in accordance with Section 4 of 2.b and Part 4 of 2.c.

3.2.6 Bond and ground non-fiber optic cable in accordance with 2.f.

3.2.7 Accomplish the requirements of 009-22 of 2.a for non-fiber optic cables upon completion of banding and prior to reconnecting.

3.2.8 Accomplish the requirements of Method 6D1 of Part 6 of 2.c for fiber optic cables upon completion of banding and prior to reconnection.

3.2.9 Reconnect each cable, using referenced drawings or retained hook-up data.

3.2.10 Prepare each cable end and serve the lead bundles in accordance with 2.b and 2.e for non-fiber optic cable and 2.c for fiber optic cable.

3.2.11 Install new cable identification tags in accordance with 2.b and 2.c, using 2.e for guidance.

3.3 Isolate and splice non-fiber optic cables in accordance with Section One, Group E of 2.b, to support work required by the individual Work Items. Fiber optic cables shall not be spliced.

3.3.1 Accomplish the requirements of 009-22 of 2.a for each spliced non-fiber optic cable.

3.3.2 Accomplish the requirements of 3.2.5 through 3.2.11.

3.4 Isolate and repair cables in accordance with Section One, Group D of 2.b for non-fiber optic cable, and Part One of 2.c for fiber optic cable to support work required by the individual Work Items.

3.4.1 Accomplish the requirements of 009-22 of 2.a for each non-fiber optic cable.

3.4.2 Accomplish the requirements of Method 6D1 of Part 6 of 2.c for each fiber optic cable.

3.4.3 Accomplish the requirements of 3.2.5 through 3.2.11.

3.5 Install each new cable, cableway, penetration, lug, and connector in accordance with 2.b, 2.e, and 2.f for non-fiber optic cable and 2.c for fiber optic cable, and referenced drawings, to support work required by the individual Work Items.

3.5.1 New cable shall conform to MIL-C-24643 (low smoke), and MIL-C-24640 (lightweight) in lieu of MIL-C-915. New Radio Frequency (RF) cables shall conform to MIL-C-17 (Rev) low smoke. New fiber optic cable shall conform to MIL-~~PRF~~-85045.

3.5.1.1 Preserve the cable data package provided with new fiber optic cable. Copy the cable data package and retain the original with the cable reel.

3.5.1.2 Submit four legible copies of a report containing copies of the cable data packages obtained in 3.5.1.1 and cable number listings of the cables taken from each reel to the SUPERVISOR.

3.5.2 Accomplish a visual and continuity test of fiber optic cable in accordance with Method 6A1 and Method 6D1 of 2.c.

3.5.2.1 Submit four legible copies of a report listing the results of the requirements of 3.5.2 to the SUPERVISOR.

3.5.3 Use existing cableways and penetrations wherever possible. Penetrations shall be correct size in accordance with 2.b and 2.c.

3.5.4 For hard-wired cables, install new wire markers conforming to **SAE-AMS-DTL-23053**, Class One, white, marked with indelible ink.

3.5.4.1 Mark in accordance with the referenced drawings and/or equipment technical manual.

3.5.4.2 Install new lugs of correct size and shape conforming to MIL-T-16366 or **SAE-AS7928**. Do not cut off strands of copper to reduce size of lead to fit lug. Use correct barrel and hole size.

3.5.4.3 Install new fiber optic connectors of the correct size and type conforming to MIL-C-83522 or MIL-C-28876.

3.5.5 Accomplish the requirements of 009-22 of 2.a upon completion of lugging, connector attachment, and banding of non-fiber optic cables.

3.5.6 Accomplish the requirements of Method 6C1 of Part 6 of 2.c upon the completion of connector attachment, slack management, and banding for fiber optic cables.

3.5.6.1 Submit four legible copies of a report listing the requirements of 3.5.6 to the SUPERVISOR, using Attachment A.

3.5.7 Connect leads to terminal boards and connectors to equipment using referenced drawings.

3.6 Weatherproof and seal connectors exposed to the weather in accordance with 2.g.

3.7 Submit a written procedure to the SUPERVISOR for review and approval prior to the initiation of production work for the installation of multipin, coaxial, and fiber optic connectors, using 2.b, 2.c, and 2.e for the minimum requirements.

3.7.1 This procedure only requires a one-time submittal/approval unless the Standard Items change and/or references change or are updated, and shall contain the following minimum information:

3.7.2 Reference the appropriate fabrication document for which the procedure is applicable.

3.7.3 Qualification requirements for the personnel performing the work.

3.7.4 Inspection and documentation forms.

3.7.5 Acceptance and rejection criteria.

3.8 Provide written designation of the Qualified Persons who will prepare electrical/fiber optic cable endings to receive connectors, assemble connector parts on the cable endings, and attach the connectors to the cable endings. Provide written designation of the Qualified Person or Persons who will supervise and inspect the execution of the process.

3.8.1 Provide written substantiation of the credentials of the Qualified Persons to the SUPERVISOR prior to the start of work.

3.8.2 Any additions or modifications of the information provided in 3.8 shall be provided in writing to the SUPERVISOR prior to the start or continuation of work.

3.9 Inspect existing cableways affected as a result of work required by the individual Work Items and interferences within the first 25 percent of contract completion. Ensure that cableways, penetrations, hangers, and associated hardware are suitable for use and are in accordance with 2.b.

3.9.1 Submit four legible copies of a report of cableway conditions not in compliance with 2.b to the SUPERVISOR, utilizing Attachment B, within 72 hours of completion of inspections.

3.10 Install new fasteners conforming to MIL-S-1222, Type One, Grade 316, stainless steel, for areas exposed to weather and high moisture areas, and Type One, Grade 2 or 5, carbon steel, zinc plated, for other areas to support work required by the individual Work Items.

3.11 Remove, install, and relocate cables which are part of the secure electrical information processing systems or are located within a secure processing space in accordance with 2.h to support work required by the individual Work Items.

3.12 Accomplish the requirements of 009-32 of 2.a for new and disturbed surfaces.

#### 4. NOTES:

4.1 Pulled-back cables are those which are disconnected and physically removed from a wireway, conduit, or cableway to protect the cable from industrial work.

4.2 Reused cables are those cables disconnected from the equipment to facilitate equipment removal.

4.3 Electrical connector fabrication is the preparation of cable endings to receive multipin connectors, coaxial connectors, fiber optic connectors, assembly of connector parts on cables, and securing connectors to cables.

4.4 A Qualified Person is defined as a person who has successfully completed formal connector fabrication training and meets the qualification requirements stated below.

4.4.1 Emphasizes the importance of connector fabrication to the performance and long-term reliability of shipboard combat systems.

4.4.2 Uses 2.b through 2.e for basic instructional material supplemented by connector manufacturer's instructional material as desired.

4.4.3 Requires classroom lecture, study, and demonstration of each topic in Group A of the Table of Contents of 2.b and 2.c.

4.4.4 Requires individual student practice in the use of specified tools and performance of connector fabrication techniques and procedures described in Groups B through H of the Table of Contents of 2.b, Parts One through 6 of 2.c, and Paragraph 2-20.2 of 2.e.

4.4.5 Requires a minimum of 32 hours of combined classroom lecture and laboratory practice in the type of connectors to be fabricated, either electrical/electronic or fiber optic.

4.5 Connector fabrication qualifications consist of:

4.5.1 Connector Fabricator Qualification requirement: Successful completion of the formal training course required in 4.4.5 plus successful completion of 40 hours on-the-job training under the tutelage of a qualified connector fabricator or a qualified connector fabrication supervisor in the type of connectors to be fabricated, either electrical/electronic or fiber optic.

4.5.2 Connector Fabrication Supervisor

Qualification requirement: Successful completion of the formal classroom training required in 4.4.5 plus be the incumbent of a supervisory electrical or electronic mechanic position.

4.5.3 Connector Fabrication Quality Assurance Inspector

Qualification requirement: Successful completion of the formal classroom training required in 4.4.5 plus be the incumbent of a quality assurance specialist or inspector position.

ATTACHMENT A  
OPTICAL MEASUREMENT RECORD

DATE \_\_\_\_\_ HULL NUMBER \_\_\_\_\_  
 INSPECTED BY \_\_\_\_\_ CODE \_\_\_\_\_ INSPECTING ORGANIZATION \_\_\_\_\_ TELEPHONE \_\_\_\_\_  
 ENDPOINT LOCATIONS OR EQUIPMENT NAME: SOURCE \_\_\_\_\_ DETECTOR \_\_\_\_\_  
 INSTALLATION/CONFIGURATION DRAWING \_\_\_\_\_ CABLE SERIAL NUMBER \_\_\_\_\_  
 CABLE TYPE<sup>1</sup> \_\_\_\_\_ REFRACTIVE INDEX OF FIBER<sup>2</sup> \_\_\_\_\_ ATTENUATION/KM<sup>3</sup> @1300 NM \_\_\_\_\_ @850 NM \_\_\_\_\_  
 CONNECTOR TYPE(S)<sup>1</sup> \_\_\_\_\_ TEST EQUIPMENT MANUFACTURER/MODEL NO. \_\_\_\_\_  
 SERIAL NO. \_\_\_\_\_ CALIBRATION DUE DATE \_\_\_\_\_ SOURCE WAVELENGTH(S)(NM) \_\_\_\_\_ / \_\_\_\_\_

SOURCE CABLE NO. <sup>4</sup>	DETECTOR CABLE NO. <sup>4</sup>	1300NM/850NM WINDOW (CIRCLE ONE)									
FIBER COLOR <sup>5</sup> OR NUMBER	FIBER COLOR <sup>5</sup> OR NUMBER	ACCEPTABLE LOSS (dB)	FORWARD REFERENCE POWER	FORWARD MEASURED POWER	FORWARD LOSS (dB)	FORWARD RETURN LOSS (dB)	REVERSE REFERENCE POWER	REVERSE MEASURED POWER	REVERSE LOSS (dB)	REVERSE RETURN LOSS (dB)	CABLE/LINK LENGTH (M)

NOTES: <sup>1</sup>RECORD MIL-SPEC NUMBER IF APPLICABLE.

<sup>2</sup>RECORD VALUE FROM CABLE REEL DATA SHEET, IF UNAVAILABLE DEFAULT TO 1.490.

<sup>3</sup>RECORD VALUES FROM CABLE REEL DATA SHEET.

<sup>4</sup>FOR LINK MEASUREMENTS ONLY.

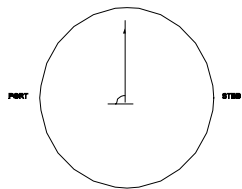
<sup>5</sup>STANDARD COLORS: BLUE, ORANGE, GREEN, BROWN, SLATE, WHITE, RED, BLACK, YELLOW, VIOLET, PINK, TAN

CONNECTOR END FACE QUALITY: \_\_\_\_\_

CONNECTION LIST: \_\_\_\_\_

REMARKS: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_



ATTACHMENT B  
ELECTRICAL CABLEWAY INSPECTION FORM

DATE \_\_\_\_\_ HULL NUMBER \_\_\_\_\_

INSPECTED BY \_\_\_\_\_ INSPECTING ORGANIZATION \_\_\_\_\_

SER #	COMPT	DECK	FRAME	P/S	POS	CABLE CIRUIT DESIG	CABLE TYPE	*CAT	*NAVSEA DWG NO.	EQUIPMENT
DESCRIPTION										
DESCRIPTION										
DESCRIPTION										
DESCRIPTION										

\* TO BE FILLED IN BY THE SUPERVISOR.